

# Functions, Limits, Derivatives

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## Learning Outcomes:

Identify properties of elementary functions (formed by composition of power, exponential, logarithmic, and trigonometric functions and their inverses).

# Functions

## Definition of a Function

A **function**  $f$  is a rule that assigns to each element  $x$  in a set  $D$  exactly one element, called  $f(x)$ , in a set  $E$ .

Set  $D$  is called the \_\_\_\_\_ of the function.

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Set  $D$  is called the **domain** of the function.

Set  $E$  is called the **range** of the function.

## Your Very First Flash Card

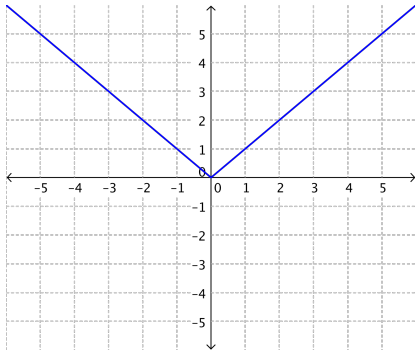
$$\sqrt{x^2} =$$

- (A)  $x$
- (B)  $-x$
- (C)  $|x|$
- (D) undefined

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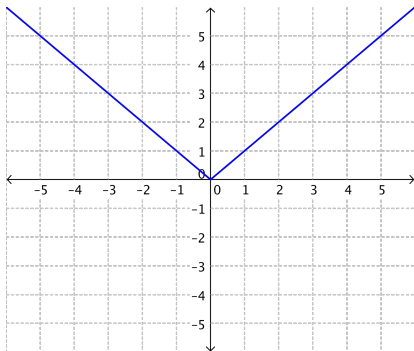


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$$\sqrt{x^2} = \begin{cases} -x, & x < 0 \\ x, & x \geq 0 \end{cases}$$

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## Parent Functions

You should be able to identify by name and sketch a graph of each of the following parent functions.

1.  $y = x$

2.  $y = |x|$

3.  $y = x^2$

4.  $y = x^3$

5.  $y = x^b$

6.  $y = \sqrt{x}$

7.  $y = \sqrt[3]{x}$

8.  $y = \frac{1}{x}$

9.  $y = 2^x$

10.  $y = e^x$

11.  $y = \ln x$

12.  $y = \frac{1}{1+e^{-x}}$

13.  $y = \sin x$

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**The End.**